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ABSTRACT

This study focuses on the teacher link in the successful implementation of technology in the learning environment and investigates the attitudes toward technology of teachers from three school districts in Louisiana. Differences among school systems, teaching level, gender, and teaching experience are studied. To assess the attitudes of the respondents in the study, the Teacher's Attitude Toward Information Technology (TAT) survey instrument was distributed to the faculties of the Monroe City Schools (an urban system), the Ouachita Parish Schools (an urban/rural system), and the Winn Parish Schools (a rural system). Approximately 500 questionnaires were distributed to the faculty of these systems; of these, 242 were returned. Findings showed that attitudinal differences about technology were present among the teachers representing these systems. The urban system teachers exhibited a better attitude compared to the urban/rural and the rural system. (MES)

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The Effects of Technology on the Attitudes of Classroom Teachers (E-TACT)

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Introduction

Everyday, one sees or hears news about the latest advancements in educational technology and what these new technologies can do for our children and their learning environment. The focus of these studies concentrated on the effects of technology in the classroom and on the students. One major aspect, which is often overlooked in these investigations, is that of the teacher's attitude toward this technology and its utility as a learning tool. This study focuses on the often-overlooked teacher-link in the successful implementation of technology in the learning environment and investigates the attitudes towards technology of teachers from three school districts in Louisiana. In this research, differences among school systems, teaching level, gender, and teaching experience are studied. This study surveyed K-12 teachers representing three types of school systems - an urban system, a rural/urban system, and a rural system.

Survey Instruments

To assess the attitudes of the respondents in the study, the Teacher's Attitude Toward Information Technology (TAT) version 1.1 survey instrument was distributed to the faculties of the Monroe City Schools (an urban system), the Ouachita Parish Schools (an urban/rural system), and the Winn Parish Schools (a rural system). The TAT, which is composed of ten separate subscales, was developed and verified by the Texas Center for Educational Technology (TCET). TCET operates under the auspices of the University of North Texas and was developed by Christensen and Knezek (1998). Eight of the subscales are semantic differential subscales and were constructed using Zaichkowsky's (1985) Modified Personal Involvement Inventory. These subscales focus on a person's perceived relevance of the object based on inherent needs, values, and interests. The other two subscales uses Kay's semantic perception of computers (Kay, 1993) and D'Souza's (1992) classroom learning via electronic mail.

The Survey

The survey consisted of teachers from the Monroe City School System (MCSS), the Ouachita Parish School System (OPSS), and the Winn Parish School System (WPSS). Approximately five hundred (500) questionnaires were distributed to the faculty of these systems. Of these two hundred and forty-two (242) were returned for a return rate of 48 percent. The teaching level and system distributions are given in Table 1. In this study, there were 98 elementary school teachers, 42 middle school teachers, and 102 high school teachers. Furthermore, there were 101 teachers representing the urban school (MPSS), 68 teachers representing the urban/rural system (OPSS), and 73 teachers representing the rural system (WPSS), respectively. The study also consisted of by 42 males and 200 female teachers.

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Table 1
Faculty Distributions

LEVEL	MCSS	OPSS	WPSS	TOTAL
Elementary	28	29	41	98
Middle	19	10	13	42
High School	54	29	19	102
TOTAL	101	68	73	242

The survey results documented the various levels of teaching experience. The distributions of experience level by system are shown in Table 2. The survey consisted of 14 new or first year teachers, 38 teachers with 2 to 5 years experience, 46 teachers with 6 to 10 years of experience, 33 teachers with 11 to 15 years of experience, and 110 teachers with 15 or more years of experience.

Table 2
Teacher Experience

Years	MCSS	OPSS	WPSS	TOTAL
0 - 1	6	2	6	14
2 - 5	17	9	12	38
6 -10	15	21	10	46
11 -15	14	10	9	33
15+	48	26	36	110
TOTAL	100	68	73	241 *

* One of the teachers did not respond to the question pertaining to teaching experience.

In summary, the two hundred and forty-two respondents, who returned the questionnaire for this research, adequately represented the three systems in each of the categories of teaching level, gender, and teaching experience.

Research Hypotheses

The research hypotheses of interest are multifaceted and consist of comparing the teacher's attitude toward technology by school system, teaching level, gender, and teaching experience. Friedman's two-way analysis of variance (ANOVA) by ranks was chosen as the statistical procedure for evaluating these hypotheses. This non-parametric procedure was chosen over other statistical methods so that we may circumvent any problems with the assumptions of these methods. Friedman's two-way ANOVA by ranks makes no assumptions and uses the ranks of the data rather than the data itself. The hypotheses of interest are:

Hypothesis 1: Teacher attitudes toward technology are not dependent on the system..
Hypothesis 2: Teacher attitudes toward technology are not dependent on the teaching level.
Hypotheses 3: Teacher attitudes toward technology are not dependent on gender differences.
Hypotheses 4: Teacher attitudes toward technology are not dependent on teaching experience.

Descriptive Statistics

The TAT subscales used in the evaluation and testing of these hypotheses are given in Table 3. Subscales F1, F3, and F7 relate to the teacher's attitude about e-mail, multimedia, and the WWW. Subscale F5 relates to attitudes on how technology can improve the teacher's productivity. Subscales F2, F4, and F8, on the other hand, represent the teacher's perception of the student's attitude toward e-mail,multimeadia, and the WWW. Subscale F6

Table 3
TAT version 1.1 Subscales

TAT Subscale	Description
F1	To me, e-mail is
F2	To my students, e-mail is
F3	To me, multimedia is
F4	To my students, multimedia is
F5	To me, my productivity is
F6	To my students, their productivity is
F7	To me, the WWW is
F8	To my students, the WWW is
F9	E-Mail in my classroom
F10	Computers are

relates to the teacher's perception of what technology can do for the productivity of their students, and subscales F9 and F10 relate to the teacher's attitude about e-mail in the classroom and to the teacher's general feelings about computers, respectively.

The data collected from this survey are summarized in Tables 4 through 7. Table 4 displays the average subscale values by school system; whereas, Tables 5, 6, and 7 display the average subscale values by grade level, gender, and teaching experience, respectively. The original data, quantified by the survey, ranged from 1 to 7,

Table 4

School Systems
Average Scaled TAT Scores

TAT Indices	MCSS	OPSS	WPSS
To me,			
F1: e-mail is	1.79	0.92	1.39
F3: multimedia is	2.36	1.84	2.12
F5: my productivity is	2.46	2.08	2.29
F7: the WWW is	2.40	1.78	2.22
To my students			
F2: e-mail is	0.88	0.61	0.74
F4: multimedia is	2.00	1.65	2.07
F6: their productivity is	2.23	2.04	2.40
F8: the WWW is	1.92	1.74	1.95
General			
F9:e-mail for the class is	0.53	0.16	0.34
F10: computers are	1.94	1.42	1.90

where 1 was a least favorable or a negative attitude and 7 was a most favorable or a positive attitude about the subscale being measured. A response of 4 represented an "I Don't Know" or "Not Sure" response. These values were recorded for the subscales of F1 through F8 and F10. Unlike these subscales, F9 was measured using a Likert scale with values ranging from 1 to 5 with 3 as the "I Don't Know" or "Not Sure" response and 1 for "Strongly Disagree" and 5 for "Strongly Agree." For this investigation, the data values were scaled to be centered about zero. For subscales F1 through F8 and F10 the values were scaled to -3 to 3. For subscale F9 the values scaled to -2 to 2. The most negative number represents the strongly disagree or the most negative attitude about the subscale; whereas, the most positive represents the strongly agree or the most positive attitude about the subscale.

Table 5
Grade Levels
Average Scaled TAT Scores

TAT Indices	ELEM	MIDDLE	HIGH
To me,			
F1: e-mail is	1.36	1.19	1.58
F3: multimedia is	2.08	2.44	2.08
F5: my productivity is	2.21	2.51	2.32
F7: the WWW is	2.03	2.31	2.26
To my students,			
F2: e-mail is	0.50	0.63	1.08
F4: multimedia is	1.88	2.04	1.94
F6: their productivity is	2.36	2.41	2.04
F8: the WWW is	1.66	2.02	2.04
General			
F9: e-mail for the class is	0.36	0.31	0.40
F10: computers are	1.82	1.87	1.71

Table 6
Gender
Average Scaled TAT Scores

TAT Indices	MALES	FEMALES
To me,		
F1: e-mail is	1.12	1.48
F3: multimedia is	1.61	2.25
F5: my productivity is	1.60	2.45
F7: the WWW is	2.05	2.20
To my students,		
F2: e-mail is 0.67	0.78	
F4: multimedia is	1.46	2.02
F6: their productivity is	1.39	2.40
F8: the WWW is	1.69	1.92
General		
F9: e-mail for the class is	0.37	0.39
F10: computers are	1.29	1.88

Results of the Study

The Friedman's nonparametric two-way analysis of variance by ranks test is used to evaluate the research hypotheses of this study. The two-way design developed by Friedman is the non-parametric extension to a two-way blocking design. The primary difference between the two designs lies in the fact that Friedman's analysis uses ranks; whereas, the block design uses quantitative or measured data. The blocks for the two-way ANOVA are represented by the TAT subscales F1 - F10 and the groups are represented by either school systems, teaching levels, gender, or teaching experience, depending of the hypothesis of interest. The data representing the cells of the two-way tables in this study are composed of TAT scores for each teacher in that category. In order to assess

Table 7
Teaching Experience Groups
Average Scaled TAT Scores

TAT Indices	0-1	2-5	6-10	11-15	16 or More
To me,					
F1: e-mail is	2.11	1.38	1.28	1.84	1.26
F3: multimedia is	2.59	2.02	2.21	2.44	1.98
F5: my productivity is	2.67	2.00	2.33	2.62	2.24
F7: the WWW is	2.61	2.03	2.04	2.57	2.09
To my students,					
F2: e-mail is	1.20	0.18	0.85	0.80	0.79
F4: multimedia is	2.09	1.60	2.16	2.17	1.83
F6: their productivity is	2.26	1.93	2.35	2.65	2.13
F8: the WWW is	2.36	1.58	1.94	2.31	1.73
General					
F9: e-mail for the class is	0.84	0.18	0.32	0.37	0.35
F10: computers are	2.02	1.75	1.72	1.98	1.71

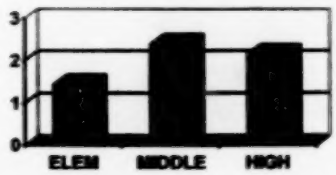
average differences in the attitude of the teachers in our study, the data representing a cell in the two-way ANVOA were averaged prior to any analysis. The authors of this report felt that the average scaled values of the TAT subscales reflected the teacher's feelings about technology and as such these average feelings were used to evaluate the hypotheses of interest.

Systems. In this study, there were three types of systems - the urban system (MCSS), the urban/rural system (OPSS), and the rural system (WPSS). In this regard, the Friedman's anova by ranks indicated that a significant difference is present among the three types of school systems (χ^2 =15.80, p-value = 0.000). MCSS exhibited the largest average rank of 2.70; whereas, WPSS had the next largest rank of 2.30. OPSS had the smallest rank of 1.00. Tukey-Kramer's test indicated that MCSS's rank was significantly larger than OPSS's rank, and that the average rank of WPSS was not different for either MCSS or OPSS. Figure 1 depicts the average ranks by system.

Teaching Levels. When evaluating teaching levels, the data were divided into three mutually exclusive groups - elementary teachers, middle school teachers, and high school teachers. As with systems, the average TAT subscale score was used to represent the feelings about technology of the teachers in each of these three categories. The Friedman's two-way ANOVA indicated that a weak dependency on teaching levels is present (χ^2 =4.974, p-value = 0.083). Figure 2 depicts the average ranks by teaching level.

Figure 1

Figure 2



Gender. When evaluating gender differences, the data were divided into the two gender groups of Males and Females. The average TAT subscale was used to represent the feelings about technology of the male and female teachers. The two way anova by ranks indicated that the female teachers had a better attitude about technology than their male counterparts (χ^2 =10.00, p-value = 0.002). Figure 3 depicts the average ranks by gender.

Experience Levels. When evaluating differences in attitudes among the five teaching levels of 0-1 yrs, 2-5 yrs, 6-10 yrs, 11-15 yrs, and 15 or more years of experience, the average TAT score for each of the ten indices were used to represent the average feelings of teachers in each of these groups. The two-way ANOVA by ranks indicated that differences among the five groups are present (χ^2 =27.280, p-value = 0.000). Tukey-Kramer's technique indicated that groups 1 and 4 had the best attitudes toward technology and that they were better than groups 2, 3 and 5 which exhibited similar attitudes. Figure 4 shows the average ranks by experience level.

Figure 3

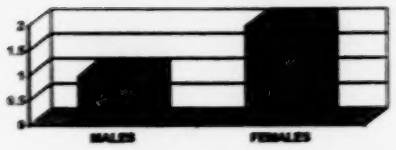
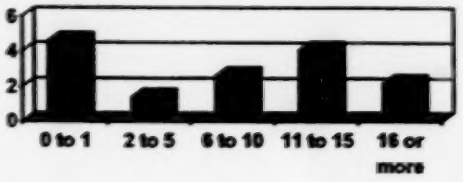


Figure 4



Summary

In conclusion, this study found that the average feelings of the teachers representing the three school systems did show that attitudinal differences about technology were present among the teachers representing these systems. The urban system (MCSS) teachers exhibited a better attitude when compared to the urban/rural (OPSS) and the rural system (WPSS). The survey indicated that the MCSS teachers' average attitude toward technology was 1.8 with a range of 0.53 (F2) to 2.46 (F5). WPSS averaged 1.6 with a range of 0.34 (F2) to 2.4 (F6); whereas, OPSS averaged 1.32 with a range of 0.16 (F2) to 2.08 (F5). Attitudes about e-mail were the lowest recorded values for the study. The teachers were not sure about what e-mail could do for their classroom or for their students. Overall the teachers representing the three systems felt optimist about technology; however, these feelings were not as positive as we hoped. The research showed that the he female teacher had a better attitude about technology than their male colleagues. The average attitude of the male teacher was 1.21 with a range of 0.27 to 2.05; whereas, the average attitude of the female teacher was 1.67 with a range of 0.39 to 2.5. Consistently, the male teachers had smaller averages than the female teachers on each of the TAT subscales. The analysis further indicated that a weak dependency on the teaching level is present. Elementary teachers have the lowest average score (1.5) when compared to their middle (1.7) and high school (1.6) colleagues. The TAT subscales for all groups ranged from 0.36 (F2) TO 2.51 (F5). When considering the category of experience levels, we a priori felt that the attitudes of the teachers would be decreasing over time. However, this was not the case. The first year teacher had the highest average 2.03 with a range of 0.84 (F2) to 2.7 (F5). The 2-5 year teachers had the lowest average of 1.4 with a range of 0.18 (F2) to 2.03 (F7). The 6-10 year teachers displayed an average of 1.6 with a range of 0.34 (F2) to 2.4 (F6). The 11 – 15 year teachers had an average of 1.9 with a range of 0.37 (F2) to 2.7 (F6); and lastly, the 16 or more years of experience teachers had an average of 1.5 with a range of 0.37 (F2) to 2.2 (F5).

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